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EDWARD H. COXE

THE FIRE IN THE SUNDAY CREEK COAL COMPANY'S MINE NUMBER 10.

BY EDWARD H. COXE, C. E.

This mine is situated in Trimble Township, Athens County, O., two miles southwest of Glouster, on the Mud Fork branch of the Toledo & Ohio Central Railroad, and in the No. 6 or Middle Kittanning seam of the Ohio coal measures. The shafts were sunk about 1886, and the mine has run quite steadily since, about one-third of the entire territory of 1,000 acres being mined. Some 315 miners and day hands worked in the mine, and the daily capacity was 1,400 tons. The seam mined is about 6 ft. thick, having a parting of slate about 2 in. thick and from 8 to 16 inches of bone-coal which is gobbled. Above this in the vicinity of the fire is a slate about 2 in. thick, then 1 ft. of cannel coal, and between that and the sand rock is from 3 to 5 ft. of soapstone; and in some places a seam of coal, called top-coal or roosters from 1 to 2 ft. thick between the cannel and soapstone. At the north end of the east stable the sand-rock came down to the coal and cut it down to 4½ ft.

The hoist-shaft is 111 ft. deep, and the main entries run north and south from it. The air-shaft is 138 ft. deep, the top being on higher ground than the hoist-shaft. The mine is ventilated by two force fans at the top of the air-shaft, the air being split at the bottom, part ventilating the north side of the mine and the balance the south side, the hoist-shaft being the upcast for both.

Prior to the fire the coal was mined by compressed air, and the haulage all done by horses and mules, 32 in all being used and stabled in the mine. All these perished; being, with one exception, smothered or overcome by smoke or black-damp, or white-damp.

The mine was drained by four pumps, one a No. 9 Pulling, located at A, Fig. 1, over a large sump, and a 1-in. pipe led from there direct to the east stable. On December 1st 1896, the water in this pipe froze at B, and the stable boss and pumper thawed it out, as was customary, by burning some oily waste

around it. This operation was finished about 11 o'clock, but they stayed there till noon to be sure there was no fire left, but a spark must have gotten into some dry manure under the pipe and been fanned into a blaze, for while some of the day hands at the bottom were eating their dinner, fire broke through the brattice between A and B, Fig. 1. The men rang for a cage, to go up. As all the sumps connected with the big pump had just been pumped dry and the pump stopped, there was no water on the bottom for use. Before the cage got started the fire had reached the steps in the east end of the hoist-shaft, and was increasing and it was soon impossible to go up or down by this shaft. Some of the miners on their way out about this time, finding the exit cut off by the fire, went up the ladder in the air-shaft.

The various drivers went back to their respective territories and spread the alarm, bringing back in the car with them what men they could. One fan, that over the ladder, was stopped and moved and a snatch-block rigged up, and while some of the men came up the ladder a few of the older were hauled up on a rope, and at two o'clock all were out. Up to this time the other fan could not be stopped or the hoist-shaft covered, on account of keeping the air-shaft clear, as there was now no other exit, so the fire had a good draft.

The brattice between A and B was soon burned out, which kept the fire from spreading through the mine by giving it a direct draft from shaft to shaft, but the fire soon communicated to the timbers and steps in the hoist-shaft. A bucket brigade was formed, the pipe from the reservoir turned down the shaft, and the Glouster Fire Department, consisting of a hand-pump and line of hose, telephoned for.

They could do but little good, for shortly after the last man got out it was impossible to get down the air-shaft, and the draft up the hoist-shaft was so strong and hot that the water thrown down was forced back as steam. As soon as the fire in the mine was found to be beyond control, a fire engine from Columbus, 75 miles distant, was telegraphed for, but it suffered several delays and did not arrive until 7 o'clock, while the fire caught the tippie at 3 o'clock, and it was entirely consumed, and the engine-house partly, before 6 o'clock. Part of the engine-house was saved. At the time of the fire one cage was near the bottom of the shaft, and the other at the ground landing, and when it was found that the tippie could not be saved the ropes were cut, letting the cages drop, together with some of the shaft timbers, pipes, etc., and some of the rock from the shaft. When the tippie collapsed part of it went down. All

these together partially choked the hoist-shaft and forced the draft up the air-shaft. Then both shafts were covered with planks, with clay piled on them, sand being spread over the whole as soon as it could be procured. Both shafts were covered 18 hours after the fire broke out, and being made as nearly air-tight as possible the fire was left to smother till January 6th.

When the shafts were first sunk there was a broad brattice built down the middle of the air-shaft to split the air, and a fan on each side of it, but a few years ago it was torn out from the bottom about 30 ft. up. The ladder was on the north side of this brattice.

On January 6th the air-shaft was opened, a shed, well sealed, having been built over the south half of it and one fan, the north half being uncovered first. A strong combination of gases and a light smoke issued from the shaft, though it did not come up steadily, at times the shaft clearing so that you could see to the bottom.

Everything being ready the fan was started very slowly, the north half of the shaft being the upcast, and a windlass was rigged up in the fan-house. Then Mr. C. C. Sharp, superintendent for the company, went down as far as the bottom of the brattice, but it was impossible to go any farther on account of the gas. So far no damage had been done, nor was there any sign of fire. Then a platform was made and swung on the end of the rope and two men went down and built a canvas brattice from the bottom of the old wooden one down to the level of the roof of the entry, the west half being extended down to the bottom. Then a horizontal brattice was built across the southeast quarter of the shaft level with the roof, and a vertical one north and south across the south half of the shaft from the horizontal one to the bottom, as shown in Fig. 1. This sent the air to the bottom and around the end of the last mentioned brattice and let us on the bottom on the night of January 7th, where we found that from the appearance of things there had either been fire or an intense heat back as far as the air-shaft, but we could see no sign of existing fire except a faint, almost indistinguishable reflection a considerable distance to the south, though we could get only 15 or 20 ft. from the shaft on account of the heat and gas. We then hung a temporary canvas brattice across the entry just south of the shaft to keep back the gases and allow us to get around in the return in the north half of the shaft where, finding no signs of fire, but a large amount of black damp, we built a tight board brattice across the entry at C, Fig. 1. We then took down the brattice south of the shaft and started in that direction,

carrying a cloth brattice up the center of the entry as we went, as shown in Fig. 1, and taking a hose line with us, connected with a pump on top. The slate and cannel coal were fallen in spots, but readily leveled. We found a little fire along the west rib and a light fall at D. The former was easily extinguished with water and the latter distributed along the entry. At E we came to a high fall of everything below the sand rock and from 1 to 3 ft. of that almost filling up the entry. Here also we found fire in the cannel and top coal under the fall and on the west rib and a little farther ahead on the east rib also. We cleaned up only enough of this fall to allow us to get over it and be sure we were leaving no fire under us. The dirt we wheeled back in a barrow and piled it along the entry rib and bottom, leaving only room for the barrow. In this way we reached the breakthrough F, and found it was not fallen except part of the cannel. We dug down here low enough to crawl in and went through to the main entry finding that doors at F and G were entirely burned out. It was so hot and the air so foul on the main entry that it was only possible to stay long enough to take a brief glance, but this showed that the hoist-shaft was filled up as high as the eye could reach and a fall extending north from H, but between these points only the cannel and a few inches of the top coal were down and no sign of fire.

By this time our dirt room on the dark entry was about filled up, and progress was very slow, the advance in 48 hours being only 20 ft., owing to the heat, steam, amount of dirt to be moved and the cramped space for working. It was then decided that it was necessary to get on the main entry and work from there. So on the night of January 11th we dropped back to E, Fig. 1, tearing down our cloth brattice from there to the fire, and at E built a stone brattice across the entry, daubing it with clay, thus shutting in the fire; but before this brattice was finished we ran a pipe line down the shaft and to a point about 10 ft. north of F, and discharged water there to keep the fire from working back, the pipe passing through the brattice.

We then drove the breakthrough, indicated by dotted lines on Fig. 1, to the main entry. This breakthrough was driven 2½ ft. high and 5 ft. wide, and was finished on January 15th. To make room for this dirt we moved the brattice north of the shaft from C to K, making a flap in the shaft brattice to wheel through. This breakthrough being finished, we tore out the last half of the brattice at E and extended our canvas brattice to it. This sent the air as indicated in Fig. 2. We then built brattices H. and L of boards, laid a track on top of the dirt

in the main entry and through the breakthrough to F, Fig. 2; made a small car and started to move the dirt out to the main entry, keeping our hose with us and in constant use; but before we got across the dark entry, so that we could brattice off the north end of the stable, all our available space was filled with dirt, so that we were compelled to abandon this plan. The only course now left open which would not force air through the fire while we worked was to get south of the hoist-shaft. To do this we first built rock brattices at G across the breakthrough, and at E across the dark entry, Fig. 2, and board ones a few inches from them, and filled between with sand, the pipe line being still left in this brattice, E, and discharging as before mentioned. Before the brattice G was finished, the fire had gotten enough air to make a good blaze which reached above the fall to the roof in the dark entry. This shut the fire off on the north, and to get south we had to force the air through a part of the workings, a distance of about $1\frac{1}{4}$ miles. To do this we tore out brattice at K, built a brattice across the breakthrough at I, and one across the first east north entry at 2, and opened the doors 3 and 4, Fig. 2, to do which we had to put up a cloth brattice along the center of the dark entry north from the air shaft to keep air with us. We then made a hole in the brattice L, Fig. 2, tore the canvas brattice out of the dark entry back to the air-shaft, and bratticed across the east half of the dark entry at I, to keep the air from returning as it had been.

We then gave the fans full head of steam, the one over the outlet having been rigged up to exhaust and despite the fact that many experienced miners claim this plan would not succeed on account of the large body of black damp to be moved, the air moved as desired, and in 20 minutes we went through the brattice L, and around the manway to the south side on the night of January 19th. Here we found no sign of fire except a large volume of steam and smoke coming from the hoist-shaft and traveling south, and this prevented us from going further in that direction. Then to keep the air from the fire we fixed brattice L as in Fig. 3 and the air traveled as indicated. We now built brattice M, but before we got this up we had good need for our hose, for a bright fire blazed up in the manway N on January 20th, and from the danger of bringing down the top in the main entry which had a loose end at the shaft, we held back the water, hoping to get a good row of posts across before applying it; but the fire grew too fast for us, and before we got two posts up it had worked out on the main entry and started south with the air along the rib and in the loose coal lying at the bottom. A full head of water from the hose, how-

ever, forced it in a few minutes back into the manway and in two hours clear back into the pump-house, and fortunately the top did not fall. This kept down the steam and smoke. Before we got the brattice north of the hoist-shaft fixed as in Fig. 3, a couple of small red spots of fire showed up at O, near the roof, so we put a tee in our water pipe at P, running a branch line to L, where we put another tee, from which we ran two hose lines, putting one nozzle each through the brattices L and M, and kept a man watching these and keeping the cracks well daubed with clay and changing the positions of the hose frequently. We also put a pipe line through the covering on top of the hoist-shaft and ran water down there. This at first created so much steam, that it worked its way through the brattices and cracks in the roof and ribs near them and forced all hands back to the bottom of the air-shaft, but it soon cleared up and allowed us to proceed. We found the main entry south in about the same condition as north, except that there was no high fall.

There were still two openings to the fire at R and S, Fig. 3. To close these we ran a canvas brattice from T across the main entry and through the center of the breakthrough, where doors at U and V had been burned out, but the partially charred frames still left standing. This carried the air around the end of the brattice, and we could get north on the dark entry to W, where we found no fire but plenty of heat and a fall of considerable height. So we built a brattice at R and went ahead with our cloth brattice to S, which allowed us to go into the stable to X, where we found a fall, and the stalls between S and X nearly burned out. Though the fall did not appear to be very high, it was too hot and the air too bad to go any further. Then we built a brattice across the stable at S. This entirely closed in the fire. Then we opened a hole about a foot square in the top of the hoist-shaft to carry off the steam and smoke, and opened a hole in brattice M, expecting to tear it out and handle the dirt from there; but though we could get through it was soon apparent that the fire was getting too much draft, so we closed shaft and brattice again and decided to advance north on the dark entry to the fire. To do this and get room to gob our dirt we tore out the cloth brattice from T to S and then built a cloth brattice across the breakthrough at Z to keep back the black-damp, and tore out the old wooden brattice at Y, and put a cloth brattice across the entry at Q, leaving a small hole in it to allow enough air to pass to keep the entry clear enough for the men to unload the dirt. In tearing out the brattice Y considerable white-damp was encountered in this breakthrough

and the men were badly affected by it. Before we succeeded we had to run a canvas brattice across the entry and through the breakthrough.

This gave us the whole main entry from shaft to Q to unload dirt and we needed about all this room. We now laid a track in the main entry and through the breakthrough U Fig. 4. We then tore out the brattice across the dark entry at R, and found there was quite a bright fire at W, sufficient air having gotten to this point to start it up. We then ran a cloth brattice from Z, Fig. 4, up the center of the dark entry and carried the air as shown, also keeping a hose line with us, with which we speedily extinguished what fire was in sight and what showed up as we moved the fall and we had to move a considerable amount of dirt to get at it, for in no other way were we able to extinguish it. From W the fall got higher as we advanced till we got to B, on January 30th, and from here it was about level to F, Fig. 4, where we left it on the north. We wheeled the dirt in barrows back to C, Fig. 4, and from there in cars, running two of each. We had considerable trouble getting past the breakthrough at B, as besides the fire ahead we had fire also in breakthrough A, and finding it impossible to keep both in check with one hose we took the one from brattice M, and alternated the one in L between L and M, these brattices being now cooler than they had been.

Fortunately we were able to work through the breakthrough A to the edge of the shaft without carrying a brattice through with us, for as we moved the dirt out the air circulated around there before going to the return, but we had to work low to keep under the steam. At this point the fire seemed to have considerable draft from the north, and we discovered that air, as it passed across the end of the canvas brattice, went through the breakthrough D, and through the north end of the stable to the fire, fanning it toward us. So we built a stone brattice well daubed in this breakthrough, which bettered this trouble. Now having gotten the breakthrough A cleaned out, the fire out to B, and finding that the fire in the shaft was drowned out, and thinking to gain time by getting our cars nearer to the work we hung a canvas brattice at U and tore out part of brattice M, turning most of the air through this way, and started to clean up the bottom of the shaft, but after moving a little dirt we found that the cages, wire ropes, 40-lb. rails used as slides, 5-in. compressed air pipes, 5 in. water pipe, 2 in. steam pipe, 2½ in. exhaust pipe, 1 in. pipe used as speaking tube, iron gates and timbers from shaft and tiddle and rock from shaft were all jammed and bound together in almost one mass, and it was

decided that the fire would get too much air while these were being cut out; so we closed up M again and opened U and proceeded as before. Now, in getting past breakthrough A the steam hung so low and was so hot and the roof was so high that we could not get a brattice close at the top and it was impossible to get by B at all, so we built a brattice about 5 ft. high across the east end of breakthrough A and put a canvas overcast from it to the brattice in the center of the entry. This enabled us to proceed, though considerable steam frequently worked through the overcast, and early on the morning of Feb. 6th we reached the point F, where we had abandoned the fire on the north, and we got the last of it out. We then got into the east stable and found there was no fire there. We then opened the hoist-shaft and found that everything in it except the 12 X 12 in. oak lining from the top to the rock, about 20 ft., was either burned or gone to the bottom.

The work of fighting the fire was divided into two 12 hour shifts, the writer being in charge of the night shift. On each shift were four firemen who worked two at a time and changed every two hours. The number of other men employed depended on circumstances, but we never had any more in the mine at one time than was necessary, six being the maximum. It was a dangerous work, but fortunately no one was hurt, though several were at times made very sick.

The mine is now equipped with self-dumping cages, and the compressed air replaced by electricity, the Morgan-Gardner Electric Company, of Chicago, having furnished the plant consisting of 2 75 K. W. dynamos and 2 100 H. P. Skinner engines, two six-ton motors and five chain-cutting machines.

PRESIDENT RAY: This is an accurate record of the controlling of the fire in this mine. Under other circumstances, methods would be different. I think this is one of the most valuable papers we have had, because it is a plain statement of the facts which existed in this mine. I feel that Mr. Coxe has given us a very valuable paper here.

MR. COXE: If there is any gentleman here who does not understand, I will do anything I can to make the matter more clear.

PRESIDENT RAY: Any other experiences with fires might be in order here.

SECRETARY HASELTINE: There are several gentlemen here who have had quite a good deal of experience with mine fires.

PRESIDENT RAY: I can give you one experience which I had in one of the Columbus, Hocking Coal & Iron Company's mines. While it was not so difficult a problem as this one, still it was a very good one. Most of you know the Moon mine at Buchtel. The mine spread out over two or three hundred acres,—one of those laid out "by guess and by God." When it was first opened, entries were run in nearly every direction, and some left with too narrow a pillar between, and all those things calculated to make a squeeze. Entries went in the direction of Nelsonville, very long, about a mile, I think, from the mine opening to this point I wish to speak about. The outline would be something like this (illustrating on blackboard). Entries came down in that direction to this point (indicating). The rooms were here. On this room (indicating) was an outside opening, driven quite crooked like that (indicating), the object being to take in props from the timber land that extended over those hills. This had been driven while the mine was leased and it was purely an accident that the engineer corps had discovered the opening and got it on the maps. These three rooms were connected by break-throughs that way (indicating), but were not connected with the rooms on either side of them. There was a good wide pillar there. This was the start of the fire. When the contractors had quit, they left three or four hundred props scattered along in this narrow space (indicating). They had laid there three or four years and became seasoned and dried. Some boys had been playing "Indian" around there and had a fire, and this is supposed to have caught from the fire the boys kindled. It burned a week or so before it was discovered. The superintendent was afraid the fire was in this entry (indicating) and would get back in the mine. He sent some men in here (indicating) and they could only get as far as these entries running north and south. The entry was nearly closed shut here. He was afraid the fire had gotten back into the main entry. These rooms were connected, but not connected with the other part of the mine. It was reasoned that the air current would naturally take the short way and

induce the fire to work out rather than in the mine; and it was suggested that we drive an opening from the outside and strike this corner of the room with a small hole, to see if it was burning in this room (indicating). If past this point, to close that hole and drive an opening through this pillar, parallel to the room, put in brick stoppings, walling the fire in these three rooms, providing the fire was not in the main entry. The only thing we had to locate the room were the stakes set by Mr. Jennings' corps, and we struck the corner of the room exact. We broke through lightly and found the fire had not passed this point. We opened out bravely, went in and cleared the way for a broad brattice; made it tight and another eighteen inches from that put another board brattice and filled in between with sand to make it tight. Everything had gone nicely, the men were tired, and it was decided to take a sleep that night and Monday morning complete the work. A fall occurred here which caused a rush of air which blew out the board brattice and closed the air here (indicating) and the current came out through a new opening here. We then shoveled dirt through the new opening and closed it tight, and let it stand for four or five or six hours. Then we made a small hole there (indicating) with a drill, probably two inches wide, and the air, smoke and steam came out through there. We did not know what to do. It was finally considered that the only hope was to enlarge the old opening and try to get current enough to change the air current by burning a good many props. We opened the hole larger and larger and as it came nearer night our currents acted better. We got a car over the top loaded with this dirt, hauled it to the corner here (indicating) and shoveled the dirt until we got the fire shut off: rolled the dirt over and over until we got to this point and reclaimed the ground lost by the brattice breaking in. About a foot and half opening was kept, for if it was larger it would be easier for the air to come against us than to go away; but by having a man with a board, three feet square to keep the dirt from rolling down on us, were enabled to get the brick wall in. To recover what we had lost it took two days and nights constant work. When we first commenced to shovel, it was so hot it took a pretty nerry man to

shovel more than two or three shovels before he gave way to another. After this brick stop was put in here, then the fire was walled in from the old opening and extinguished.

You see it was a comparatively simple problem to the one Mr. Coxe has illustrated, but we found even this pretty trying.

MR. COXE: How long after the brick stoppings were finished were they torn out and the fire found to be extinguished?

PRESIDENT RAY: I do not think they were ever torn out.

MR. HANLON: How far was the new entry driven?

PRESIDENT RAY: About 150 feet.

SECRETARY HASELTINE: I have had experience enough to fill a book, but I have no experience that I can describe with the minuteness which Mr. Coxe has the fire at Mine No. 10.

I never had any experience with fire until since I have been connected with the mining department, and the first that I had occurred in Mine Number Three at Rendville. The fire had then been going on for I do not know how long. Mr. Miller wired me to come down, and he had then been at work several days—maybe day and night—in trying to confine it. The origin was perhaps spontaneous combustion. The fire lay in the rooms between entries running, I think, north from the main entry, and the entry had been built up, owing to a depression in the coal floor, so that the road was above the top of the coal, or nearly so; probably about half way up to the top of the coal there, about seven or eight feet, I think. Through the neck of all these rooms the fire was taking air. They had built stoppings of the gob to close the air off the day before, and during the night what they termed an “explosion” took place, which blew them down. It may have been an explosion or it may have been a fall of roof coal extending over several rooms. At all events, they re-established the stoppings as best they could, and attempted to build better ones of board and brick. When I arrived, they were just getting the brick and material there for the work. The only way to control the fire seemed to be the one being pursued: that was, to cut off the supply current. The

discharge current was extended through old works into old abandoned mines, many of which had breaks to the surface for more than a mile along the bank of the Sunday Creek, and to prevent it extending into the solid part of the mine, the plan was to cut off the intake air. This we did by building walls across the neck of the entries, and in one case built it diagonally across the neck of the butt entry and main entry at the same time. The fire was so close to the main entry pillar, in fact, it was on fire inside the gob at frequent intervals, and burning over the apex and over the men's heads, and it was hard to keep the men at work on account of the black damp.

Mr. Miller, with his usual fertility of mind in an emergency, conceived the idea of making whitewash as thick as it could be mixed, and dashed it on by the bucketful on the gob. This heat caused the lime to crystalize and made a crust and held in place until reinforced with more loose material from behind, and thus kept the fire back until the wall was completed. Then, the stopping of the necks of these rooms was quite a problem on account of the loose coal found in the long entry. While we could stop the necks of these rooms (some 17 in number), there was no way from stopping the air drawing through under the neck of the rooms. To dig down, one could not live with his head on the level of the rails; but the supply of air was so thoroughly cut off, fortunately, perhaps, that there has never been any bad effects from the fire. It is still walled in, but I never knew of any signs of fire along the side of the hill afterwards. I know I examined the hill breaks to see what chance there was for closing them up. The snow was on at that time. In one place there had been a covey of quail which had taken refuge in a break, that were suffocated.

The next experience was after the mine had been walled in at Jacksonville. I went down with District Inspector Beattie to consult as to the opening of the mine.

What I mean to say is that in the fires which the department has been called upon to assist in quenching, we never attempted to resort to the use of water. The practice has been to seal them up, and in every instance this has been successful.

We had one experience at Straitsville a few years ago, where a fire had been in existence since the strike of '84. The mine had been sealed up at that time after it was on fire several months, and the company had spent some eleven or twelve thousand dollars in walling it in. It afterwards broke out while being operated by a contractor and the contractor spent five thousand dollars walling it in. It again broke out and no one, apparently, had authority or means to close it in, and the department was appealed to by the people who owned the surface and homes immediately over it. The fire had then progressed until it was so close to the surface as to be very dangerous and a few days, perhaps, would have prevented any opportunity of closing it up at all. This occurred some two years ago and I think there have been no signs of fire since.

The expense at that time for closing it in was about three hundred and fifty dollars, and it has stood so long now that it will stay forever unless there would come a fall, or some accident of that kind that would destroy the stoppings.

I wish to say that I do not think there is any rule that can be laid down for fighting fire. The circumstances which surround each fire must govern as to the mode of attacking it. There is no doubt but water is the most available under some conditions, while in others the ability to wall it in is probably the best. Authorities who write on the subject, many of them discourage the use of water. The argument is that water applied under high pressure carries a large amount of oxygen which feeds the fire. Especially in a gob fire, it will extinguish the fire immediately under the water, but have no effect on the fire a foot distant; and some of the most able English writers assert that mine fires cannot be extinguished except by submerging. But there are instances in this country, and here we have one, where the fire was extinguished without being compelled to submerge it.

MR. COXE: Mr. Haseltine's remarks just called to my mind a few minor points connected with our fire which I did not bring out. As to surface cracks: in part of the territory the room pillars have been entirely drawn out, and for fear of surface

cracks, we sent some men with a mine boss and they spent a whole day looking for surface cracks over those portions of the mine, but found none.

In regard to the air working under the lost coal, in our case where the top coal had fallen, there was from one to three feet of it, and as what I read brought out, we used a great amount of water. The larger part of this drained to the south-east. That part of the mine is lower than the shaft. In some places a small amount of water was on the bottom, and in the case of every brattice which was intended to be kept up for more than a day or two, we dug a trench down either to fire clay bottom, or so the bottom of the brattice would be under several inches of water, preventing the air from going under.

In regard to smothering being the best way of killing a fire, I believe in that thoroughly; but in consulting with a great many people I came to the conclusion that we had allowed the fire to smother long enough. We gave it a week longer than most people versed in matters of that kind said was necessary. When we opened the shaft we saw no evidences of fire until at the bottom, and then only an almost indistinguishable light in the distance. No doubt air was admitted after opening the shaft, and that air went in with the water and aided the fire to a large extent. But after we had gone as far as we did, we came to the conclusion that we would gain more time by proceeding along the lines already outlined than to give up and smother the fire again, as we almost thought on two or three occasions we would have to do. But as far as the water only killing the part of the fire on top is concerned, there Mr. Haseltine is right again. But wherever we went over a fall, we assured ourselves that the fire was entirely out. We had an iron bar which he kept on hand all the time, and at frequent intervals we drove that iron bar to the fire clay bottom and left it there long enough for it to become warm if there was any fire there; and we never proceeded further until the bar came up absolutely cold. Then we knew we were leaving no fire under us.

SECRETARY HASELTINE: I think the mode of procedure here was exactly right under the circumstances.

The months that elapsed from the time of the fire until the mine was opened ready to enter into the old workings, was so great that I was very much disturbed about the condition of the thirty-two horses which had been smothered. I consulted Dr. Probst, Secretary of State Board of Health, the highest authority, as to what to do to disinfect these horses. I knew that it would be absolutely impossible to turn on a very heavy current of air to sweep away the carbonated hydrogen gas and carbonic acid from the mines. The horses were undoubtedly in a high state of putrefaction, and in approaching them the air would be heavily laden with microbes and might be very dangerous to human life. We talked of using quicklime, but that would be too slow and then there would be danger in spreading it in a confined place to the men using it. He then suggested carbonate of lime, about six ounces to a bucket of water. The company secured a barrel of the lime, and I went down to witness the operation, to a point just south of where the air receiver was located, across the main south entry. In attempting to open the door we had great difficulty, for the reason that three horses were lying with their heads against the door, evidently having stood as close as possible to get what air was leaking, and had fallen there across each other. About half a bucket of carbonate of lime was mixed with a barrel of water. Here were sixteen horses lying in a space of perhaps two hundred feet, two lying in the butt entry to the right, and the rest on the main south entry. This material being cheap, we used it liberally and spread the floor of the entry with it, using three buckets of lime to each horse. In this way we saturated the first ten or twelve and allowed it to absorb for half an hour. Then with hooks turned the horses over one at a time and drenched them again. We laid a stretcher, it might, be called, made of scantling and boards, and after we had saturated the horse put him on the stretcher, and six or eight of us carried it down the entry till we came to a bank car. We loaded them at first without disinfecting the under side and by the time we

got to the bottom of the shaft the current of air was so strong and the odor so great we were forced to fly into the breakthroughs out of the air current. After that we saturated it on the other side and picked the horse up and loaded it. We loaded faster than they could unload on the outside, after the first experience. We first saturated the horse, allowing it to absorb the carbonate of lime a half hour, then turned it over and again saturated it, and in fifteen minutes picked it up on the board and handled it without a particle of odor in that confined place. Nearly all were taken out in half a day. The rest were scattered and taken later. If ever you get into a scrape of that kind, the simple, cheap lime, costing three or four dollars a barrel, will disinfect a half hundred horses so perfectly that you can handle them without danger. This is a little foreign to the subject in hand, but may be of use to someone.

MR. THOMAS: Was it necessary to use any "Kentucky water" along with that disinfectant?

SECRETARY HASELTINE: No, sir; I want to say there were no foreign substances taken into the mine, as far as I know.

MR. COXE: Was any taken in internally?

SECRETARY HASELTINE: No, sir; I would not recommend it. I presume Mr. Thomas was prompted to that remark on account of an experience where a bunch of horses were to be moved and I gave written directions for removing them with the use of carbonate of lime, as prescribed, and offered to assist if desired. But, as I understand it, in order to save a dollar and a half in lime, they used fire water instead. The other is the humane and decent way to proceed, and I felt flattered by the success attending our efforts, because it is a proposition which has annoyed me a good deal in connection with mine fires—how to get the dead horses out.

MR. BEATTIE: It occurs to me that there was a development there in the fighting of Number 10 fire which might be valuable to medical science, if probed into. I refer to the case where a man was scared to death, and afterwards was found eating his lunch on the surface. (Laughter.)

MR. COXE: That was only figuratively speaking. The man who was "scared to death" was actually scared to death, as far as any use he could be to us was concerned. He was no more use than if he was dead. We did not want that kind of a man around the place.

PRESIDENT RAY: The point is well taken by Mr. Beattie.

MR. THOMAS: I move we extend a vote of thanks to Mr. Coxé for his able paper.

Seconded; carried.

MR. BANCROFT: I desire to ask, in reference to the fire in Number Three, whether it broke out in that section which had been on fire before?

MR. HASELTINE: No, sir. The section which had been on fire, or reported on fire, lay between Numbers One and Two butt entries and Three and Four butt entries. That was sealed in, as I remember. This fire broke out between entries Four and Six, and had extended across entries Five and Six and into rooms between Seven and Eight, when it was finally closed in.

MR. BANCROFT: The reason I asked, is that I was always under the impression that the fire broke out in the old fire territory, and when I was with Mr. Rend—a fire occurred before I went with him there and they had the whole business bratticed off with brick, only one timber brattice. A report got among the drivers that the fire was working again, and one Thanksgiving Day I went in and examined all the brattices to see if there was anything of the sort, when there was no one working. There was one place where they had perhaps driven right through into the burned district. I found no fire, but black damp, and I imagined the second fire had occurred there and I could not understand how the fire occurred in black damp. How do you account for the black damp at the top of the entry? How do you account for the fact that in Rend's Number Four mine at Jacksonville the fire damp was in the bottom of the swamp?

SECRETARY HASELTINE: I would like to have someone answer that question for my benefit. We looked for fire damp

on high ground, fully expecting it, at Jacksonville, and to avoid it drilled down in the low ground to see what quantity of black damp there would be and what probability there would be of the fire being extinguished, and there encountered fire damp in the low place.

MR. BANCROFT: Fire damp comes up at the bottom of the slope.

MR. BEATTIE: To explain the position the Chief has taken in the matter, he probably is not aware that while the fire damp came up through the holes drilled in the roof, the black damp remained below.

SECRETARY HASELTINE: The roof at that point was more than thirty feet below the highest point.

MR. BANCROFT: The fire damp is formed below the coal and does not originate in the coal. I have seen chunks raised right out of the bottom by fire damp.

MR. COXE: I have experimented a little in mines in a small way with fire damp. In several cases found it in small pockets in the roof, as Mr. Ray has shown in the sketch on the board; and I have frequently noticed that it burns for a long time in holes drilled for shooting and sometimes burns there until we put it out, which goes to show that fire damp comes direct from the solid coal. In other places where the entry has been left for a considerable time, when we first open up and go to work considerable gas is evidenced. A part of our mine was left unworked and when these same works were started up again within the year, that part of the mine at Number Ten is making more gas than any other part, which, I think, tends to prove the gas comes from solid coal and will only work through a certain amount of coal.

MR. BANCROFT: My theory is,—and I guess, as a matter of fact, the composition of natural gas and fire damp is about the same,—that it is mainly natural gas which gets up through the bottom. I have seen a wall of coal as solid, apparently, as the

plaster there, from which a jet will come out and burn like gas from an apparently close face of coal.

One of the biggest fires I ever had in a mine occurred after the men had quit work in the entry and come up Saturday night. They did not go back to see what the shot had done, and the shot ignited a jet in the wall, and on Monday morning the whole face of the entry was burning like the mischief.

MR. CLIFFORD: While fire damp is found in coal seams, great quantities of fire damp is found in the roof overlying the seam. The general opinion is that the gas comes from the breaking of the earth's crust at anticline; distilled in the primary formation at a point where solidity ceases.

MR. BANCROFT: I have formed that idea from a practice of fourteen years.

MR. CLIFFORD: If the gas in coal mines was all below the coal itself, then we should have the same condition in metalliferous mines, where they go down three thousand feet.

CAPTAIN MORRIS: Mr. President, I would like to ask one question. I have seen many times in the anthracite region in Pennsylvania large ditches on each side of the entries, and you put your hand down through the mud and put a lamp down, and the gas would go right along with it.

MR. LOVE: We are getting the cart before the horse. I see here on the program a paper by Mr. Ralston on "Gases Met With in Mines." I think we are getting the discussion before the paper.

Upon motion, meeting adjourned until 1:30 p. m.

FOURTH SESSION—FRIDAY, JANUARY 21. ' .

After the meeting was called to order, the following paper was announced and read by the author, D. C. Thomas, C. E., Glouster, Ohio: